



## Information Science and Technology Center Seminar Series



**Dr. Frederica Darema**  
**United States Air Force**

### "InfoSymbiotics - The power of Dynamic Data Driven Applications Systems (DDDAS)"

**Tuesday, May 24, 2011**  
**3:00 - 4:00 PM**

**TA-3, Bldg. 1690 Room 102 (CNLS Conference Room)**

**Abstract:** InfoSymbiotics embodies the power of Dynamic Data Driven Applications Systems (DDDAS), a concept whereby application simulation models are dynamically integrated in a feed-back loop with the real-time data-acquisition and control components of the application system. Advanced capabilities can be created through such new computational approaches and new instrumentation methods. New modeling and simulation capabilities include: enhancing the accuracy of the application computational model by complementing and augmenting the application model with on-line measurement-data, streamed into the model at execution time and in targeted parts of the solution phase-space; or replace parts of the computation with instrumentation data streamed into the model at execution time, thus speeding-up the computation to either allow more comprehensive models of a system, or create decision support systems with the accuracy of full-scale simulations. Moreover, the notion of the executing application selectively guiding instrumentation processes, creates more efficient and effective measurement and data management capabilities, including the challenges of how to architect and dynamically manage large numbers of heterogeneous sensors and controllers; rather than the static and ad-hoc ways of today, with DDDAS these sets of resources and be managed dynamically and adaptively, and in optimized ways. The talk will present these concepts as well as a research agenda for creating these new capabilities and in the context of application areas where InfoSymbiotics/DDDAS can have transformative impact.

**Biography:** Dr. Frederica Darema, a member of the Senior Executive Service, is the Director, Mathematics, Information and Life Sciences, Air Force Office of Scientific Research, Arlington, Va. She provides executive direction in the planning, conduct and coordination of broad, frequently large-scale, and critical basic research and development program activities. These include the areas as advanced mathematical and computational methods for dynamic systems; information and decision systems; bio-systems; human cognition and socio-cultural systems.

Dr. Darema is a graduate of the University of Athens, Greece; the Illinois Institute of Technology; and the University of California at Davis, where she attended as a Fulbright Scholar and a Distinguished Scholar. After physics research associate positions at the University of Pittsburgh and Brookhaven National Laboratory, she received an American Physics Society Industrial Postdoctoral Fellowship and became a technical staff member in the Nuclear Sciences Department at Schlumberger-Doll Research. Subsequently, she joined the T.J. Watson IBM Research Center as a research staff member and group manager. While at IBM, she also served in the IBM Corporate Strategy Group examining and helping to set corporate-wide strategies. From 1996 to 1998, she completed a two-year interagency assignment at the Defense Advanced Research Projects Agency.

Prior to her current assignment, Dr. Darema was at the National Science Foundation where she held executive level positions as Senior Science and Technology Adviser and Senior Science Analyst in the Computer and Information Science and Engineering Directorate. She has given numerous keynote speeches and presentations in professional forums. Dr. Darema's scientific and technical contributions include development of parallel applications; parallel algorithms; programming models; environments and systems performance engineering for the design of applications and of software for parallel and distributed systems.



**UNCLASSIFIED**

**For more information contact the technical host Frank Alexander, [fja@lanl.gov](mailto:fja@lanl.gov), 665-4518. If you would like an appointment to speak to Dr. Darema, please contact Josephine Olivas, [jojo@lanl.gov](mailto:jojo@lanl.gov), 663-5725.  
Hosted by the Information Science and Technology Center (ISTC)**